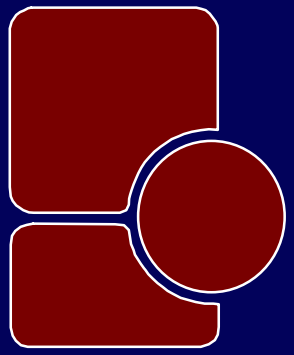
Joint Legislative Audit and Review Commission
of the Virginia General Assembly



Forecasting in Four Major State Programs

Staff Briefing
July 10, 2000

Introduction

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Presentation Outline

- ☑ **Background**
- ☐ Comparing the Forecasts
- ☐ Adult Inmate Forecasting
- ☐ Elementary and Secondary Education Enrollment Forecasting
- ☐ Higher Education Forecasting
- ☐ Medicaid Forecasting

Report Background

- Joint Commission on the Commonwealth's Planning and Budget Process, final report (1999):
  - "As a starting point, it would be preferable to focus on projected expenditure trends in the budget drivers that account for the bulk of the growth in the general fund budget: Medicaid, adult and juvenile corrections, public education, and higher education."
- At the October 1999 meeting, JLARC affirmed focus on budget drivers
- This report is the initial oversight effort on these major expenditure forecasts

Report Milestones

- 1999 General Assembly funded fiscal analysis unit within JLARC staff
- July-October, 1999: Fiscal analysis section staff hired
- Entry meetings with agencies, 1999:
  - August 10: Department of Education
  - September 9: State Council of Higher Education for Virginia
  - October 14: Department of Corrections
  - November 5: Department of Medical Assistance Services
  - November 16: Weldon Cooper Center for Public Service
  - December 16: Department of Planning and Budget

Report Milestones
(continued)

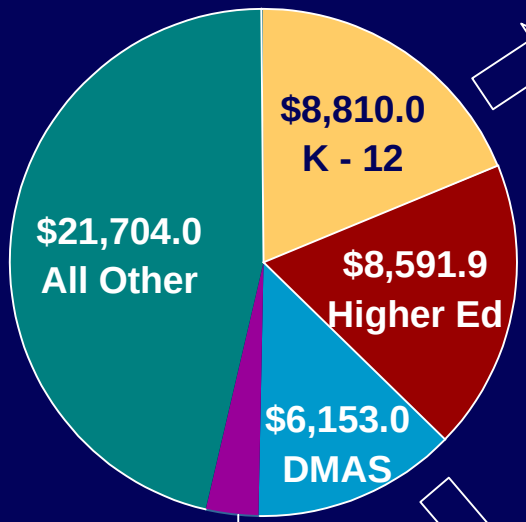
- December-February: Fiscal Impact Statement process; research on forecasting
- March 30: Draft submitted to 6 agencies for initial review
- April 28: Agency comments received
- June 19: Exposure draft submitted for review to 6 agencies and 4 Governor's Secretaries
- July 10: Commission briefing on report

Conclusions

- 3 of the 4 forecasts are strongly linked to State budget
- All derive from appropriate data sources and statistical procedures, and have been correctly applied
- Accuracy in FY 1999 generally improved over prior years
  - Annual budget process permits adjustments based on revised forecasts
- Next JLARC forecasting report will examine Medicaid forecast in more detail
  - Responds to new statutory requirement (SB 515) that JLARC receive the Medicaid forecast by November 15 each year

Major Components of the State Budget
2000-2002
(in Millions of Dollars)

Total Budget:
$46,911.8



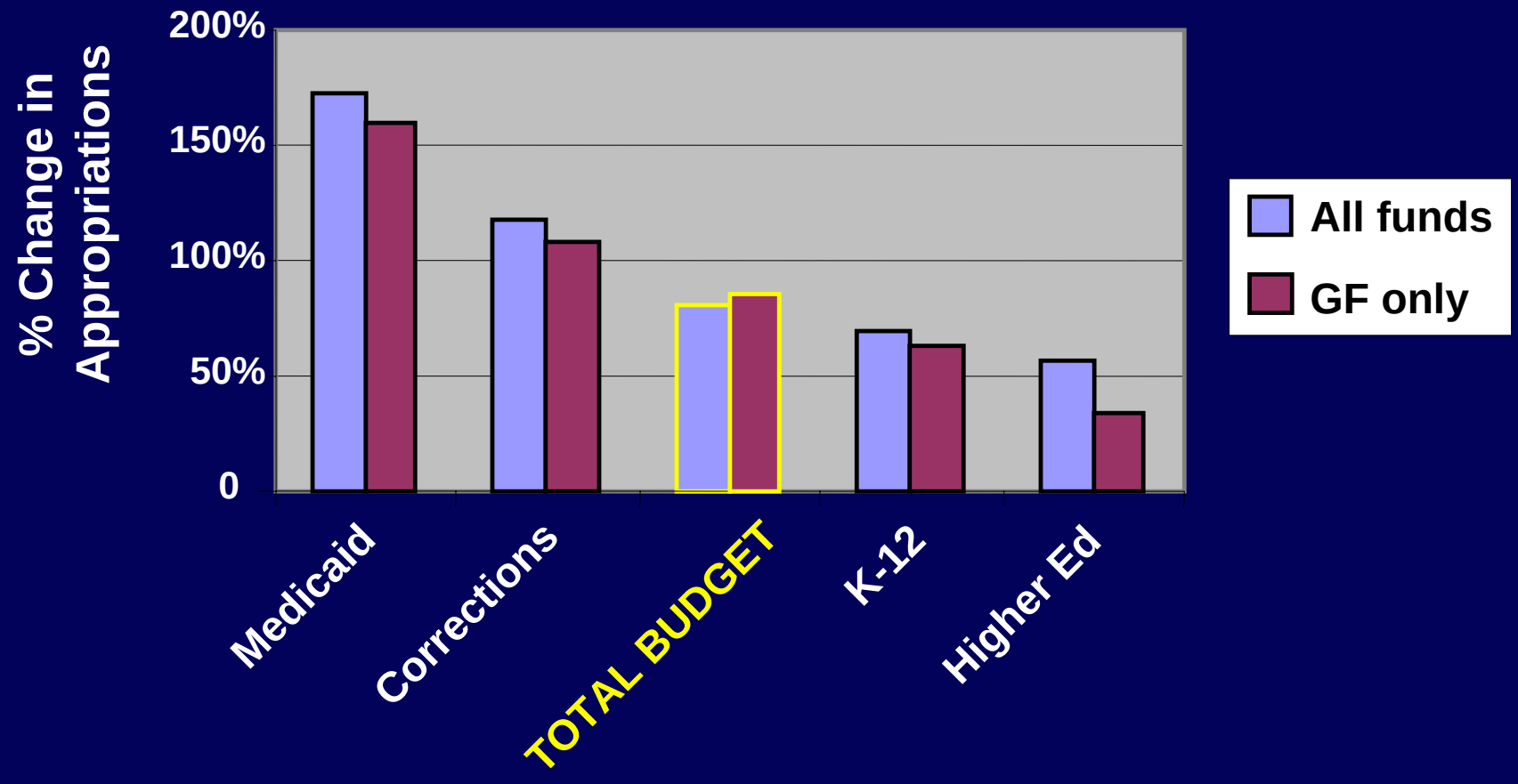
NGF $842.3
GF $7,967.7
67% of K-12 General Fund Dollars Tied to Forecast

NGF $5,447.0
GF $3,144.9
0% of Higher Education General Fund Dollars Tied to Forecast

NGF $3,226.3
GF $2,926.7
96% of DMAS General Fund Dollars Tied to Forecast

NGF $194.6
GF $1,458.3
82% of Corrections General Fund Dollars Tied to Forecast

Growth in Major Programs
FY 1990 - 2000



Presentation Outline

- ☐ Background
- ☑ **Comparing the Forecasts**
- ☐ Adult Inmate Forecasting
- ☐ Elementary and Secondary Education Enrollment Forecasting
- ☐ Higher Education Forecasting
- ☐ Medicaid Forecasting

Comparing the Forecasts

- **Differences between forecasted and observed numbers are inevitable**
  - **Can be caused by unexpected events, technical flaws, changes in policy or underlying factors**
- **Differences can be gauged two ways:**
  - **Percentage difference between forecast and actual**
  - **Fiscal impact of the difference**

Accuracy of 1997-98 Forecasts Used to Prepare FY 1999 Budget

Program Area	Units of Measurement	Accuracy of *Initial* FY 1999 Forecast	Accuracy of *Revised* FY 1999 Forecast
Elementary & Secondary Education Enrollment	Average Daily Membership	+0.3%	+0.1%
Higher Education	Headcount	-0.4%	-0.4%
	FTEs	-0.6%	0.0%
Medicaid	Expenditures	-0.71%	+0.83%
State-Responsible Inmate Population	Population	+0.8%	+0.04%

Fiscal Impact of Forecasts

- Funding shortfall in Medicaid of $19.7 million (general funds) in FY 1999
  - Initial forecast off by -0.71%
  - Other factors contributed to the shortfall
  - Funds were advanced from FY 2000 to cover the shortfall, then restored by HB 29
- Initial appropriation for Direct Aid in FY 1999 was $8.8 million more than needed, based on actual school attendance (ADM)
  - Initial ADM forecast high by +0.3%
  - DOE re-programmed funds throughout the year

Fiscal Impact of Forecasts

- Expectation of accurate forecasts that require no adjustments to a budget over a 2- to 3-year period is necessary but somewhat unrealistic
- Annual budget process somewhat mitigates the need for such longer-term precision
  - Forecasts are revised annually, coinciding with annual budget process
  - Appropriation Act provides for mid- year adjustments, within certain limits and criteria

Forecasts Stem from Decision Processes

- Involvement in finalizing forecasts, and amount of information brought to bear, varies:
  - Inmate population forecasters present their work to a technical committee, a policy committee, and then submit it to the Secretary of Public Safety for adoption
  - Medicaid forecast is selected by DPB after comparison of forecasts by DMAS and DPB staff
  - DOE forecasters invite local school divisions to comment on forecasts for their division, and use CPS forecast
  - SCHEV staff meet with DPB and institutions prior to finalizing forecasts
- DPB prepares an independent forecast for all but elementary and secondary education

Documentation Should be Improved

- Only the adult inmate population forecast results in a written report
  - Staff who generate the various forecasts brief money committee staff as needed
- Lack of documentation hinders review and may be problematic in event of unexpected staff turnover
- Scope and adequacy of documentation should be expanded

Presentation Outline

- ☐ Background
- ☐ Comparing the Forecasts
- ☑ **Adult Inmate Forecasting**
- ☐ Elementary and Secondary Education Enrollment Forecasting
- ☐ Higher Education Forecasting
- ☐ Medicaid Forecasting

Adult Inmate Forecasting

- The inmate population grew as much as 15% per year in early 1990s; it slowed to less than 6% per year by late 1990s. Annual growth of 1.2% is currently forecast for 2000-2004.
- DOC has sufficient prison bedspace for the forecasted population through 2004
- Slowed growth due to several factors:
  - Parole abolition
  - Implementation of sentencing guidelines
  - Lower rates of serious crime
  - Aging crime-prone population
  - Expanded intermediate punishment and treatment programs

Consensus Process

- A two-committee process produces the State-responsible inmate forecast:
  - Technical committee reviews trends, quantitative methods, assures technical accuracy
    - Includes staff from Departments of Corrections, Planning & Budget, Criminal Justice Services, Parole Board, Criminal Sentencing Commission, JLARC
  - Policy committee reviews projections in light of policy concerns
    - 22 members from State agencies, local law enforcement, and judicial branch
- Final report issued by Secretary of Public Safety

Inmate Forecast Derives From Several Methods

- DOC develops 5-year forecast using a simulation model, based on admissions forecast
  - Data-intensive method uses actual probabilities of inmate movement from admission through release
- DPB generates forecasts using ARIMA and exponential smoothing models
  - Time-series models rely only on inmate population data
- Technical committee reviews both DOC and DPB forecasts, recommends adjustments (as needed) and identifies a preferred forecast for the policy committee's consideration

Accuracy Remains Problematic

Accuracy of State Responsible Inmate Population Forecasts
FY 1997 – FY 2000
(Percentage difference, forecast vs. actual)

	Initial Biennial Budget	*Final* Biennial Budget
FY 97	+12.7%	+ 7.2%
FY 98	+17.2%	+12.1%
FY 99	+ 0.8%	+0.04%
FY 00	N/A	N/A

Forecast Has Direct and Indirect Fiscal Impacts

- Cost per inmate estimated at $21,300/year in FY 2000
  - Direct care = $99 million
    - Includes food, clothing, medical, etc.
    - Calculated by multiplying cost per inmate per year ($3,300) times expected population
  - Operations = $476 million
    - Includes officer salaries, facility-based costs, administration
- When forecast indicates need for additional prison beds, capital funding may be required
  - Cost per bed depends on level of security, site acquisition, size of facility, etc.
  - Sussex I & II (opened 1998) maximum security facilities cost $142.5 million with 2,444 beds ($58,300 per bed)

Process Can Serve as Model

- Committee process has advantages:
  - Divides forecasting task between technical and policy-based issues, and assigns them to appropriate personnel
  - Involves knowledgeable parties from variety of perspectives
  - Some participants have no direct stake in outcome, can be more objective
  - Improved documentation
- No process can guarantee accuracy, but including additional parties improves confidence in process and procedures used to generate forecasts

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- ☐ Background
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- ☑ **Elementary and Secondary Education Enrollment Forecasting**
- ☐ Higher Education Forecasting
- ☐ Medicaid Forecasting

Enrollment in Elementary and Secondary Public Education

- There are over 1 million students in Virginia's elementary and secondary public school system
- Enrollment is measured as ADM or Fall membership:
  - ADM - average daily number of students enrolled in a division over the first 7 months of the school year. ADM is used to allocate State Direct Aid payments among localities
  - Fall membership- the number of students enrolled in a division at the start of the school year

DOE Uses a Ratio Model to Forecast ADM

- **Division level Fall membership projection:**
  - DOE makes projections based on yearly change ratios in Fall membership
  - DOE benchmarks against Center for Public Service Fall membership projections
- **Division Level ADM Forecast**
  - DOE uses ratio of historical ADM to Fall membership to project ADM
  - DOE may manually adjust ADM projections based on information from localities

DOE's Statewide Forecast Accuracy Is Within 1%

- Statewide forecast error rate less than 1%
  - Average statewide error rates for FY 1997-2000:
    - Initial Biennial Budget: 0.4%
    - Final Amendments to the Budget: 0.1%
- Division level forecast error rates generally less than 5%
    - Divisions experiencing greater error rates typically were smaller
    - Division level errors were not consistently positive or negative

Simplicity and Acceptability Are Strengths of the Forecasting Process

- Policy officials and local governments understand DOE's straight-forward and intuitive forecasting approach
- Statewide error rates of less than 1 percent have led to general acceptance of the forecasts, although division error rates have been higher
- DOE may want to consider formalizing its relations with the Weldon Cooper Center for Public Service

Presentation Outline

- ☐ Background
- ☐ Comparing the Forecasts
- ☐ Adult Inmate Forecasting
- ☐ Elementary and Secondary Education Enrollment Forecasting
- ☑ **Higher Education Forecasting**
- ☐ Medicaid Forecasting

Higher Education Enrollment Projection Process

- 175,000 students (headcount) attend Virginia's 15 four-year institutions
- The State Council for Higher Education for Virginia (SCHEV) coordinates the higher education enrollment projection process
- SCHEV makes projections for the four-year institutions and Richard Bland College
  - SCHEV does not project enrollment in community college system, or in private institutions
- The projection process includes SCHEV, the Department of Planning and Budget (DPB), and the institutions

SCHEV's Forecasting Methods

- SCHEV staff use two methods to project Fall headcount
  - Statistical methods
  - Demographic models
- To project FTE, SCHEV staff apply historical headcount to FTE ratios

DPB and the Institutions' Projection Models

- **DPB's projections:**
  - DPB uses statistical methods such as time series models to project number of students
  - SCHEV and DPB models generally produce similar results
- **Institutions' projections**
  - Institutions generally rely on historical growth rates to project Fall headcount and FTE

Official Enrollment Projections

- SCHEV, DPB, and institution staff meet in the Spring to agree on enrollment projections for the upcoming biennium
- SCHEV and DPB projections are used to assess the reasonableness of the institutions' forecasts
- If an institution's error rates are above 5%, SCHEV, DPB, and the institutions revise forecasts in the Fall

Forecast Accuracy and Impact

- **Accuracy improved for the 1998-2000 biennium**
  - **Initial 1996-1998 biennial budget error: 2.2% to 2.8%**
  - **Initial 1998-2000 biennial budget error: -0.4% to -0.6%**
  - **Final projections of enrollment follow similar trend**
- **FTE forecast is used for ad hoc budget purposes**
  - **The 2000-2002 Budget includes $13 million in general funds in FY 2001 for enrollment growth**
  - **FTE forecast is one component in addressing need for capital projects**

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- ☑ **Medicaid Forecasting**

Medicaid Forecast Overview

- Two agencies, DPB and DMAS, produce independent Medicaid forecasts
- These agencies compare their results and discuss differences in assumptions and methods
- Of the forecasts reviewed, only Medicaid forecast is in dollar terms -- others forecast number of students, FTEs, or inmates, which then require another step to determine dollars
- DPB delivers official forecast to the General Assembly. Beginning this Fall, JLARC will also receive the forecast (SB 515).

DMAS Forecast

- DMAS uses statistical forecasting methods:
  - Regression models for large acute care categories
  - Exponential smoothing models for costs, utilization and lump sum payments
- Combined to produce monthly and annual forecast
- DMAS forecasts are used to secure federal matching funds

DPB Medicaid Forecast

- DPB uses statistical methods to forecast Medicaid:
  - Regression models for large spending categories
  - Various time series models for expenditures and utilization
- Methods are combined to produce a DPB “top line” forecast
  - “Top line” = 9 large categories of services & spending (inpatient hospital, outpatient hospital, nursing facilities, other long term care, physicians, prescription drugs, managed care, Medicare premiums, other) + mental illness
- August data forecast is key in forecasting and budget process

Forecast Accuracy

- Official forecast results from comparison of DMAS and DPB results
- Policy changes and budget adjustments may cause forecast to diverge from spending so comparisons are not always valid
- Recent accuracy of official forecast
  - Fall 1995 forecast of FY 1997: -0.68%
  - Fall 1997 forecast of FY 1999: -0.71%

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